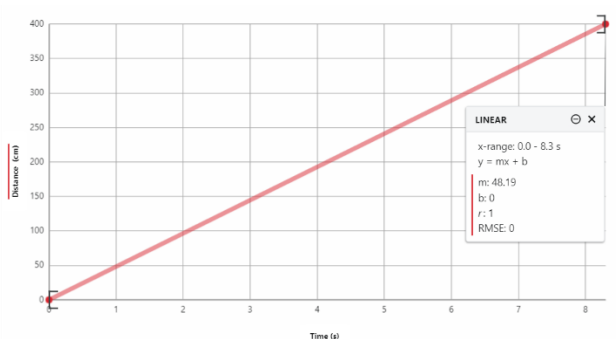


Data Collection—Table 1:

Trials	Distance (cm)	Time (s)	Average Speed (cm/s) (see question 2)
Start	0 cm	0.0	
1	100.0 cm (first section)	1.8	56 cm/s
2	200.0 cm (first two sections)	3.5	57 cm/s
3	300.0 cm (first three sections)	5.1	59 cm/s
4	400.0 cm (entire distance)	8.3	48 cm/s

Remember to include graphs A and B in this document or as separate attachments.



Data Collection – Table 2:

Overall Average Speed (cm/s) from graph B
48 cm/s

Questions: Answer using complete sentences and show your work for all calculations.

- How does the shape of graph A compare to the shape of the graph B?

Graph A has the shape of a half-parabola, as it has a quadratic relationship. For Graph B, it has the shape of a diagonal line since it has a linear relationship.

- For graph A, you can determine the average speed over any interval by using the slope formula, $m = \Delta y / \Delta x$. Using two adjacent points, determine the average speed over each interval you plotted. Be sure to **show your work** for all calculations. Include the average speeds in Table 1.

$$m = ?$$

$$m = \Delta y / \Delta x$$

Trial 1 – $\Delta y = 100.0\text{cm}$, $\Delta x = 1.8\text{s}$
 $100.0\text{cm} / 1.8\text{s} = 55.56$
 $m = 56\text{ cm/s}$

Trial 2 – $\Delta y = 200.0\text{cm}$, $\Delta x = 3.5\text{s}$
 $200.0\text{cm} / 3.5\text{s} = 57.14$
 $m = 57\text{ cm/s}$

Trial 3 – $\Delta y = 300.0\text{cm}$, $\Delta x = 5.1\text{s}$
 $300.0\text{cm}/5.1\text{s} = 58.82$
m = 59 cm/s

Trial 4 – $\Delta y = 400.0\text{cm}$, $\Delta x = 8.3\text{s}$
 $400.0\text{cm}/8.3\text{s} = 48.19$
m = 48 cm/s

3. On graph B, find the slope of the line. That is the average speed for that graph. Record that in Table 2.

The slope (m) of the line in graph B is 48.19, with the average speed being 48 cm/s.

4. Why are the speed values in Table 1 and Table 2 called "average" instead of "instantaneous"?

These values are instead called “average” because it represents how fast it is going over a period of time, whereas “instantaneous” represents how fast something is going at a specific moment in time.

5. Refer to the data from trials 1-4.
a. What happens to the average speed of the rolling ball as it moves from one 100.0 cm segment to the next 100.0 cm segment?

For trials 1 through 3 the average speed continues to increase, however decreases in trial 4.

- b. What causes the change in the ball's speed as it moves from one 100.0 cm segment to the next 100.0 cm segment?

From the start the ball goes quick as it just came off the ramp, increasing the average speed. However, as the ball travels more distance it eventually starts to gradually get slower. Because of this, the average speed then decreases.

6. How do the average speed values for the shorter intervals compare to the average speed value for Graph B?

The average speed values for the shorter intervals are larger and increase when compared to the average speed value for graph B. The shorter intervals have speed values of 56, 57, and 59 cm/s, while the average speed value for graph B is 48 cm/s.